

WHAT IS CLAIMED IS:

1. A webbing retractor in which, when a webbing for restraining a vehicle occupant is suddenly pulled-out, an inertia plate provided integrally and coaxially at an axial end side of a take-up shaft, which is supported so as to be rotatable around an axis at a frame fixed to a vehicle body and which takes-up the webbing in layers by urging force, causes a rotation delay with respect to the take-up shaft, and causes a swingably-supported pawl to swing and causes the pawl to engage with engagement teeth fixedly supported at the frame, thereby locking rotation of the take-up shaft in a webbing pull-out direction,

wherein the engagement teeth are provided so as to be rotatable around an axis with respect to the frame, and the webbing retractor comprises a holding device which, when a vehicle occupant cancels an applied state of the webbing and an entire amount of the webbing is taken-up onto the take-up shaft by urging force, holds the engagement teeth in a rotatable state, and which, at other times, holds the engagement teeth in a state in which rotation of the engagement teeth in the webbing pull-out direction is impeded.

2. The webbing retractor of claim 1, wherein the holding device comprises a pawl controllable by a cam mechanism.

3. The webbing retractor of claim 1, wherein impeding of rotation of the engagement teeth can be cancelled by determining that the webbing is in a state in which the entire amount of the webbing is taken-up by sensing a wound diameter of the webbing on the take-up shaft.

4. The webbing retractor of claim 1, wherein impeding of rotation of the engagement teeth can be cancelled by determining that the webbing is in a state in which the entire amount of the webbing is taken-up by sensing a number of times of rotation of the take-up shaft.

5. A webbing retractor comprising:

a take-up shaft taking-up, in layers and by urging force, a webbing for restraining a vehicle occupant;

a frame fixed to a vehicle body and rotatably supporting both end portions of the take-up shaft, and lock teeth are formed at a surface of the frame which surface intersects an end portion of the take-up shaft;

a lock plate provided at at least one end portion side of the take-up shaft, and able to move between a position of engagement with the lock teeth and a position of non-engagement with the lock teeth, the lock plate impeding rotation of the take-up shaft in a webbing pull-out direction by engaging with the lock teeth;

a lock wheel provided coaxially at one end portion side of the take-up shaft, and the lock wheel usually rotates integrally with the take-up shaft and holds the lock plate at the position of non-engagement, and when relative rotation arises between the take-up shaft and the lock wheel, the lock wheel moves the lock plate to the position of engagement;

a pawl swingably supported at the lock wheel, and usually held at a non-swung position by urging force;

an inertia plate disposed coaxially to the lock wheel and provided so as to be able to rotate relatively within a predetermined range, and the inertia plate usually rotates integrally with the lock wheel, and when the webbing is suddenly pulled-out, the inertia plate causes a rotation delay with respect to the take-up shaft, and moves the pawl from the non-swung position to a swung position against urging force;

an engaging member disposed coaxially to the lock wheel and provided so as to be able to rotate around an axis, and engagement teeth are formed at the engaging member at a peripheral surface side thereof opposing the pawl, and the engagement teeth engage with the pawl and stop rotation of the lock wheel in the webbing pull-out direction due to the pawl moving to the swung position; and

a holding device which, when a vehicle occupant cancels an applied state of the webbing and an entire amount of the webbing is taken-up onto the take-up shaft by urging force, holds the

engaging member in a rotatable state, and which, at other times, holds the engaging member in a state in which rotation of the engaging member in the webbing pull-out direction is impeded.

6. The webbing retractor of claim 5, wherein the lock wheel is shaped as a disc having an outer diameter which is larger than an outer diameter of an end portion of the take-up shaft.

7. The webbing retractor of claim 5, wherein the engaging member is a gear, and the gear is disposed at an outer periphery of the inertia plate, and external teeth, which are a portion of the holding device, are formed at an outer peripheral surface of the gear.

8. The webbing retractor of claim 6, wherein the take-up shaft has a rotating shaft, and the lock wheel has an axially central portion, and a cylindrical boss is formed at the axially central portion, and the boss has a pair of claws at an inner peripheral surface of the boss, and due to the rotating shaft being inserted in the boss, the lock wheel is mounted freely rotatably and coaxially with one axial direction end portion of the take-up shaft.

9. The webbing retractor of claim 7, wherein the pawl is one portion of the holding device, and the pawl has a supporting shaft and

a claw portion and is supported so as to be swingable around the supporting shaft at an outer side of the gear.

10. The webbing retractor of claim 9, wherein claw portion of the pawl can engage with the external teeth of the gear, and when the claw portion engages with the external teeth, rotation of the gear in one direction is impeded and the gear can be held.

11. The webbing retractor of claim 9, wherein when the entire amount of the webbing is taken-up, the pawl can swing in a direction of moving away from the external teeth.

12. The webbing retractor of claim 9, wherein the holding device comprises a pawl controllable by a cam mechanism.

13. The webbing retractor of claim 9, wherein locking of the gear can be cancelled by determining that the webbing is in a state in which the entire amount of the webbing is taken-up by sensing a wound diameter of the webbing on the take-up shaft.

14. The webbing retractor of claim 9, wherein locking of the gear can be cancelled by determining that the webbing is in a state in which the entire amount of the webbing is taken-up by sensing a number of times of rotation of the take-up shaft.

15. A method used in a webbing retractor, the method comprising:

holding an engaging member rotatably when a vehicle occupant cancels an applied state of a webbing for restraining a vehicle occupant and an entire amount of the webbing is taken-up onto a take-up shaft by urging force; and

at other times, holding the engaging member in a state in which rotation of the engaging member in a direction of pulling-out the webbing is impeded.

16. The method of claim 15, further comprising the step of canceling impeding of rotation of the engaging member by determining that the webbing is in a state in which the entire amount of the webbing is taken-up by sensing a wound diameter of the webbing on the take-up shaft.

17. The method of claim 15, further comprising the step of canceling impeding of rotation of the engaging member by determining that the webbing is in a state in which the entire amount of the webbing is taken-up by sensing a number of times of rotation of the take-up shaft.

18. The method of claim 15, further comprising the step of controlling the holding of the engaging member by a cam mechanism.